## AMENDMENTS TO THE CLAIMS

**Please amend claims 1, 58, 90, 99, 100 and 120, cancel claims 2, 59, 98, 123 and 151-196 and add claims 197-222, as set forth in the following listing of claims, which will replace all prior versions, and listings, of claims in the present application.**

Listing of Claims

1. (Currently Amended) A microfluidic device, comprising:

a microchannel having an interior bounded by a side wall; and

a fluid interface port formed in the side wall of the microchannel to provide access to the interior of the microchannel having a diameter, wherein the fluid interface port has a diameter that is substantially equal to the diameter of the microchannel and between about 25 μm and about 100 μm, such that when a fluid is disposed in the interior of the microchannel, the fluid forms a virtual wall at the fluid interface port.

2. (Canceled)

3. (Original) The microfluidic device of claim 1, wherein the fluid interface port has an inner wall comprising a material that is repellent to the fluid disposed in the interior of the microchannel.

4. (Original) The microfluidic device of claim 3, wherein the material comprises a hydrophobic material.

5. (Original) The microfluidic device of claim 1, wherein an interior surface of the side wall of the microchannel is attractive to the fluid disposed in the interior of the microchannel.

6. (Original) The microfluidic device of claim 5, wherein the interior surface of the side wall is formed of a hydrophilic material.

7. (Original) The microfluidic device of claim 1, further comprising a covering layer disposed over the fluid interface port for covering the fluid interface port.

8. (Original) The microfluidic device of claim 7, wherein the covering layer comprises a covering fluid that is immiscible with the fluid disposed in the interior of the microchannel.

9. (Original) The microfluidic device of claim 7, wherein the covering layer comprises a non-evaporating liquid.

10. (Original) The microfluidic device of claim 1, further comprising a second fluid interface port formed in the side wall of the microchannel, such that when a fluid in the interior of the microchannel, the fluid forms a virtual wall in the second fluid interface port.

11. (Original) The microfluidic device of claim 10, wherein the fluid interface port forms an injection port for receiving a sample and passing the sample into the interior of the microchannel, and the second fluid interface port forms an ejection port for ejecting a sample from the microchannel.

12. (Original) The microfluidic device of claim 1, further comprising a droplet generating system for forming a droplet of the fluid and for introducing the droplet to the channel through the fluid interface port.

13. (Original) The microfluidic device of claim 12, wherein the droplet generating system comprises a droplet carrying element for carrying the droplet.

14. (Original) The microfluidic device of claim 12, wherein the droplet carrying element comprises a pin for introducing the droplet to the fluid interface port by contacting the virtual wall.

15. (Original) The microfluidic device of claim 1, further comprising an optical detector disposed relative to the fluid interface port for optically detecting the fluid through the virtual wall formed in the fluid interface port.

16. (Original) The microfluidic device of claim 1, further comprising an array of fluid interface ports forming a plurality of virtual walls, wherein the array of fluid interface ports wicks an externally applied second liquid into the microchannel.

17. (Original) The microfluidic device of claim 1, wherein the fluid interface port has a cylindrical or conical shape.

18. (Original) The microfluidic device of claim 1, further comprising a first fluid disposed in the interior of the channel and forming a virtual wall in the fluid interface port.

19. (Original) The microfluidic device of claim 1, wherein the fluid interface port is adapted to allow the bi-directional exchange of fluid with the microchannel through the fluid interface port.

20. (Original) The microfluidic device of claim 1, wherein the microchannel is non-linear in shape.

21. (Original) The microfluidic device of claim 20, wherein the microchannel is substantially U-shaped.

22. (Original) The microfluidic device of claim 1, further comprising a hydrophobic patch disposed in the microchannel.

23. (Original) The microfluidic device of claim 22, wherein the hydrophobic patch is arranged substantially co-axially with the fluid interface port.

24. (Original) The microfluidic device of claim 1, wherein the microchannel comprises a semi-open channel structure formed in a substrate.

25. (Original) The microfluidic device of claim 24, further comprising a cover for covering the semi-open channel structure to form an enclosed microchannel, the enclosed microchannel forming the interior bounded by the side wall, the side wall being formed by the substrate and the cover.

26. (Original) The microfluidic device of claim 25, wherein the fluid interface port is formed in the cover.

27. (Original) The microfluidic device of claim 1, further comprising an ejector coupled to the microchannel for ejecting a droplet of a fluid disposed in the microchannel through the virtual wall in the interface port.

28. (Original) The microfluidic device of claim 27, wherein the ejector comprises at least one of a pressure pulse generator for applying a pressure pulse to the fluid to eject the droplet thereof through the virtual wall formed in the fluid interface port, a gas pressurizer, a voltage generator, and a heater located opposite the virtual wall for heating a fluid to produce a gas bubble, wherein the gas bubble ejects a droplet of the fluid through the virtual wall.

29. (Original) A microfluidic device, comprising:

a microchannel having an interior bounded by a side wall; and

a first fluid interface port formed in the side wall of the microchannel to provide access to the interior of the microchannel, such that when a fluid is disposed in the interior of the microchannel, the fluid forms a virtual wall at the first fluid interface port, wherein the microchannel is free of a second coaxially arranged fluid interface port formed in the side wall at a location opposite to the first fluid interface port.

30. (Original) The microfluidic device of claim 29, wherein the microchannel and the fluid interface port each have a diameter, wherein the diameter of the fluid interface port is substantially equal to the diameter of the microchannel.

31. (Original) The microfluidic device of claim 30, wherein the diameter of the fluid interface port is between about 25 μm and about 100 μm.

32. (Original) The microfluidic device of claim 29, wherein the fluid interface port has an inner wall comprising a material that is repellent to the fluid disposed in the interior of the microchannel.

33. (Original) The microfluidic device of claim 32, wherein the material comprises a hydrophobic material.

34. (Original) The microfluidic device of claim 29, wherein an interior surface of the side wall of the microchannel is attractive to the fluid disposed in the interior of the microchannel.

35. (Original) The microfluidic device of claim 34, wherein the interior surface of the side wall is formed of a hydrophilic material.

36. (Original) The microfluidic device of claim 29, further comprising a covering layer disposed over the fluid interface port for covering the fluid interface port.

37. (Original) The microfluidic device of claim 36, wherein the covering layer comprises a covering fluid that is immiscible with the fluid disposed in the interior of the microchannel.

38. (Original) The microfluidic device of claim 36, wherein the covering layer comprises a non-evaporating liquid.

39. (Original) The microfluidic device of claim 29, further comprising a selected other fluid interface port formed in the side wall of the microchannel, such that when a fluid is disposed in the interior of the microchannel, the fluid forms a virtual wall in the selected other fluid interface port.

40. (Original) The microfluidic device of claim 39, wherein the fluid interface port forms an injection port for receiving a sample and passing the sample into the interior of the microchannel, and the selected other fluid interface port forms an ejection port for ejecting a sample from the microchannel.

41. (Original) The microfluidic device of claim 29, further comprising a droplet generating system for forming a droplet of the fluid and for introducing the droplet to the channel through the fluid interface port.

42. (Original) The microfluidic device of claim 41, wherein the droplet generating system comprises a droplet carrying element for carrying the droplet.

43. (Original) The microfluidic device of claim 42, wherein the droplet carrying element comprises a pin for introducing the droplet to the fluid interface port by contacting the virtual wall.

44. (Original) The microfluidic device of claim 29, further comprising an optical detector disposed relative to the fluid interfacing port for optically detecting the fluid through the virtual wall formed in the fluid interface port.

45. (Original) The microfluidic device of claim 29, further comprising an array of fluid interface ports forming a plurality of virtual walls, wherein the array of fluid interface ports wicks an externally applied second liquid into the microchannel.

46. (Original) The microfluidic device of claim 29, wherein the fluid interface port has a cylindrical or conical shape.

47. (Original) The microfluidic device of claim 29, further comprising a first fluid disposed in the interior of the channel and forming a virtual wall in the fluid interface port.

48. (Original) The microfluidic device of claim 29, wherein the fluid interface port is adapted to allow the bi-directional exchange of fluid with the microchannel through the fluid interface port.

49. (Original) The microfluidic device of claim 29, wherein the microchannel is non-linear in shape.

50. (Original) The microfluidic device of claim 29, wherein the microchannel is substantially U-shaped.

51. (Original) The microfluidic device of claim 29, further comprising a hydrophobic patch disposed in the microchannel.

52. (Original) The microfluidic device of claim 51, wherein the hydrophobic patch is arranged substantially co-axially with the fluid interface port.

53. (Original) The microfluidic device of claim 29, wherein the microchannel comprises a semi-open channel structure formed in a substrate.

54. (Original) The microfluidic device of claim 53, further comprising a cover for covering the semi-open channel structure to form an enclosed microchannel, the enclosed microchannel forming the interior bounded by the side wall, the side wall being formed by the substrate and the cover.

55. (Original) The microfluidic device of claim 54, wherein the fluid interface port is formed in the cover.

56. (Original) The microfluidic device of claim 29, further comprising an ejector coupled to the microchannel for ejecting a droplet of a fluid disposed in the microchannel through the virtual wall in the interface port.

57. (Original) The microfluidic device of claim 56, wherein the ejector comprises at least one of a pressure pulse generator for applying a pressure pulse to the fluid to eject the droplet thereof through the virtual wall formed in the fluid interface port, a gas pressurizer, a voltage generator, and a heater located opposite the virtual wall for heating a fluid to produce a gas bubble, wherein the gas bubble ejects a droplet of the fluid through the virtual wall.

58. (Currently Amended) A microfluidic device, comprising:

a microchannel defining an interior bounded by a side wall; and

a fluid interface port formed in the side wall of the microchannel to provide access to the interior of the microchannel, such that when a fluid is disposed in the interior of the

microchannel, the fluid forms a virtual wall in the fluid interface port, wherein the fluid interface port has a dead volume that is less than one ~~nanoliter~~ picoliter.

59. Canceled.

60. (Original) The microfluidic device of claim 58, wherein the microchannel is free of a second coaxially arranged fluid interface port formed in the side wall at a location opposite to the first fluid interface port.

61. (Original) The microfluidic device of claim 58, wherein the microchannel and the fluid interface port each have a diameter, wherein the diameter of the fluid interface port is substantially equal to the diameter of the microchannel.

62. (Original) The microfluidic device of claim 61, wherein the diameter of the fluid interface port is between about 25 μm and about 150 μm.

63. (Original) The microfluidic device of claim 62, wherein the diameter of the fluid interface port is between about 50 μm and about 100 μm.

64. (Original) The microfluidic device of claim 58, wherein the fluid interface port has an inner wall comprising a material that is repellent to the fluid disposed in the interior of the microchannel.

65. (Original) The microfluidic device of claim 64, wherein the material comprises a hydrophobic material.

66. (Original) The microfluidic device of claim 58, wherein an interior surface of the side wall of the microchannel is attractive to the fluid disposed in the interior of the microchannel.

67. (Original) The microfluidic device of claim 66, wherein the interior surface of the side wall is formed of a hydrophilic material.

68. (Original) The microfluidic device of claim 58, further comprising a covering layer disposed over the fluid interface port for covering the fluid interface port.

69. (Original) The microfluidic device of claim 68, wherein the covering layer comprises a covering fluid that is immiscible with the fluid disposed in the interior of the microchannel.

70. (Original) The microfluidic device of claim 68, wherein the covering layer comprises a non-evaporating liquid.

71. (Original) The microfluidic device of claim 58, further comprising a selected other fluid interface port formed in the side wall of the microchannel, such that when a fluid is disposed in the interior of the microchannel, the fluid forms a virtual wall in the selected other fluid interface port.

72. (Original) The microfluidic device of claim 71, wherein the fluid interface port forms an injection port for receiving a sample and passing the sample into the interior of the microchannel, and the selected other fluid interface port forms an ejection port for ejecting a sample from the microchannel.

73. (Original) The microfluidic device of claim 58, further comprising a droplet generating system for forming a droplet of the fluid and for introducing the droplet to the channel through the fluid interface port.

74. (Original) The microfluidic device of claim 73, wherein the droplet generating system comprises a droplet carrying element for carrying the droplet.

75. (Original) The microfluidic device of claim 74, wherein the droplet carrying element comprises a pin for introducing the droplet to the fluid interface port by contacting the virtual wall.

76. (Original) The microfluidic device of claim 58, further comprising an optical detector disposed relative to the fluid interfacing port for optically detecting the fluid through the virtual wall formed in the fluid interface port.

77. (Original) The microfluidic device of claim 58, further comprising an array of fluid interface ports forming a plurality of virtual walls, wherein the array of fluid interface ports wicks an externally applied second liquid into the microchannel.

78. (Original) The microfluidic device of claim 58, wherein the fluid interface port has a cylindrical or conical shape.

79. (Original) The microfluidic device of claim 58, further comprising a first fluid disposed in the interior of the channel and forming a virtual wall in the fluid interface port.

80. (Original) The microfluidic device of claim 58, wherein the fluid interface port is adapted to allow the bi-directional exchange of fluid with the microchannel through the fluid interface port.

81. (Original) The microfluidic device of claim 58, wherein the microchannel is non-linear in shape.

82. (Original) The microfluidic device of claim 58, wherein the microchannel is substantially U-shaped.

83. (Original) The microfluidic device of claim 58, further comprising a hydrophobic patch disposed in the microchannel.

84. (Original) The microfluidic device of claim 83, wherein the hydrophobic patch is arranged substantially co-axially with the fluid interface port.

85. (Original) The microfluidic device of claim 58, wherein the microchannel comprises a semi-open channel structure formed in a substrate.

86. (Original) The microfluidic device of claim 85, further comprising a cover for covering the semi-open channel structure to form an enclosed microchannel, the enclosed microchannel forming the interior bounded by the side wall, the side wall being formed by the substrate and the cover.

87. (Original) The microfluidic device of claim 86, wherein the fluid interface port is formed in the cover.

88. (Original) The microfluidic device of claim 58, further comprising an ejector coupled to the microchannel for ejecting a droplet of a fluid disposed in the microchannel through the virtual wall in the interface port.

89. (Original) The microfluidic device of claim 88, wherein the ejector comprises at least one of a pressure pulse generator for applying a pressure pulse to the fluid to eject the droplet thereof through the virtual wall formed in the fluid interface port, a gas pressurizer, a voltage generator, and a heater located opposite the virtual wall for heating a fluid to produce a gas bubble, wherein the gas bubble ejects a droplet of the fluid through the virtual wall.

90. (Currently Amended) A microfluidic device, comprising:

a microchannel defining an interior bounded by a side wall; ~~and~~

a fluid interface port formed in the side wall of the microchannel to provide access to the interior of the microchannel, such that when a fluid is disposed in the interior of the microchannel, the fluid forms a virtual wall in the fluid interface port, wherein the fluid interface port has zero dead volume, and

a covering layer disposed over the fluid interface port for covering the fluid interface port.

91. (Original) The microfluidic device of claim 90, wherein the microchannel is free of a second coaxially arranged fluid interface port formed in the side wall at a location opposite to the first fluid interface port.

92. (Original) The microfluidic device of claim 90, wherein the microchannel and the fluid interface port each have a diameter, wherein the diameter of the fluid interface port is substantially equal to the diameter of the microchannel.

93. (Original) The microfluidic device of claim 92, wherein the diameter of the fluid interface port is between about 25 μm and about 100 μm.

94. (Original) The microfluidic device of claim 90, wherein the fluid interface port has an inner wall comprising a material that is repellent to the fluid disposed in the interior of the microchannel.

95. (Original) The microfluidic device of claim 94, wherein the material comprises a hydrophobic material.

96. (Original) The microfluidic device of claim 90, wherein an interior surface of the side wall of the microchannel is attractive to the fluid disposed in the interior of the microchannel.

97. (Original) The microfluidic device of claim 96, wherein the interior surface of the side wall is formed of a hydrophilic material.

98. (Canceled)

99. (Currently Amended) The microfluidic device of claim ~~98~~ 90, wherein the covering layer comprises a covering fluid that is immiscible with the fluid disposed in the interior of the microchannel.

100. (Currently Amended) The microfluidic device of claim ~~98~~ 90, wherein the covering layer comprises a non-evaporating liquid.

101. (Original) The microfluidic device of claim 90, further comprising a selected other fluid interface port formed in the side wall of the microchannel, such that when a fluid is disposed in

the interior of the microchannel, the fluid forms a virtual wall in the selected other fluid interface port.

102. (Original) The microfluidic device of claim 101, wherein the fluid interface port forms an injection port for receiving a sample and passing the sample into the interior of the microchannel, and the selected other fluid interface port forms an ejection port for ejecting a sample from the microchannel.

103. (Original) The microfluidic device of claim 90, further comprising a droplet generating system for forming a droplet of the fluid and for introducing the droplet to the channel through the fluid interface port.

104. (Original) The microfluidic device of claim 103, wherein the droplet generating system comprises a droplet carrying element for carrying the droplet.

105. (Original) The microfluidic device of claim 104, wherein the droplet carrying element comprises a pin for introducing the droplet to the fluid interface port by contacting the virtual wall.

106. (Original) The microfluidic device of claim 90, further comprising an optical detector disposed relative to the fluid interfacing port for optically detecting the fluid through the virtual wall formed in the fluid interface port.

107. (Original) The microfluidic device of claim 90, further comprising an array of fluid interface ports forming a plurality of virtual walls, wherein the array of fluid interface ports wicks an externally applied second liquid into the microchannel.

108. (Original) The microfluidic device of claim 90, wherein the fluid interface port has a cylindrical or conical shape.

109. (Original) The microfluidic device of claim 90, further comprising a first fluid disposed in the interior of the channel and forming a virtual wall in the fluid interface port.

110. (Original) The microfluidic device of claim 90, wherein the fluid interface port is adapted to allow the bi-directional exchange of fluid with the microchannel through the fluid interface port.

111. (Original) The microfluidic device of claim 90, wherein the microchannel is non-linear in shape.

112. (Original) The microfluidic device of claim 90, wherein the microchannel is substantially U-shaped.

113. (Original) The microfluidic device of claim 90, further comprising a hydrophobic patch disposed in the microchannel.

114. (Original) The microfluidic device of claim 113, wherein the hydrophobic patch is arranged substantially co-axially with the fluid interface port.

115. (Original) The microfluidic device of claim 90, wherein the microchannel comprises a semi-open channel structure formed in a substrate.

116. (Original) The microfluidic device of claim 115, further comprising a cover for covering the semi-open channel structure to form an enclosed microchannel, the enclosed microchannel forming the interior bounded by the side wall, the side wall being formed by the substrate and the cover.

117. (Original) The microfluidic device of claim 116, wherein the fluid interface port is formed in the cover.

118. (Original) The microfluidic device of claim 90, further comprising an ejector coupled to the microchannel for ejecting a droplet of a fluid disposed in the microchannel through the virtual wall in the interface port.

119. (Original) The microfluidic device of claim 118, wherein the ejector comprises at least one of a pressure pulse generator for applying a pressure pulse to the fluid to eject the droplet thereof through the virtual wall formed in the fluid interface port, a gas pressurizer, a voltage generator, and a heater located opposite the virtual wall for heating a fluid to produce a gas bubble, wherein the gas bubble ejects a droplet of the fluid through the virtual wall.

120. (Currently Amended) A microfluidic device, comprising:

a microchannel having an interior bounded by a side wall and having a diameter between about 25 μm and about 100 μm; and

a fluid interface port formed in the side wall of the microchannel to provide access to the interior of the microchannel, wherein the fluid interface has a diameter that is substantially equal to the diameter of the microchannel ~~is sized and dimensioned~~ such that when a fluid is disposed in the interior of the microchannel, the fluid forms a virtual wall at the fluid interface port, said virtual wall being employed as an optical window for optically analyzing the fluid in the microchannel.

121. (Original) The microfluidic device of claim 120, further comprising an optical detector disposed relative to the fluid interface port for optically analyzing the fluid through the virtual wall formed in the fluid interface port.

122. (Original) The microfluidic device of claim 120, further comprising

an optical element disposed relative to the optical window to allow an optical signal from the fluid to pass therethrough, and

an optical detector disposed relative to the optical element for measuring the optical signal from the fluid passing through the optical element.

123. (Canceled)

124. (Original) The microfluidic device of claim 120, wherein the fluid interface port has an inner wall comprising a material that is repellent to the fluid disposed in the interior of the microchannel.

125. (Original) The microfluidic device of claim 124, wherein the material comprises a hydrophobic material.

126. (Original) The microfluidic device of claim 120, wherein an interior surface of the side wall of the microchannel is attractive to the fluid disposed in the interior of the microchannel.

127. (Original) The microfluidic device of claim 126, wherein the interior surface of the side wall is formed of a hydrophilic material.

128. (Original) The microfluidic device of claim 120, further comprising a covering layer disposed over the fluid interface port for covering the fluid interface port.

129. (Original) The microfluidic device of claim 128, wherein the covering layer comprises a covering fluid that is immiscible with the fluid disposed in the interior of the microchannel.

130. (Original) The microfluidic device of claim 128, wherein the covering layer comprises a non-evaporating liquid.

131. (Original) The microfluidic device of claim 120, further comprising a second fluid interface port formed in the side wall of the microchannel, such that the fluid in the interior of the microchannel forms a virtual wall in the second fluid interface port.

132. (Original) The microfluidic device of claim 131, wherein the fluid interface port forms an injection port for receiving a sample and passing the sample into the interior of the microchannel, and the second fluid interface port forms an ejection port for ejecting a sample from the microchannel.

133. (Original) The microfluidic device of claim 120, further comprising a droplet generating system for forming a droplet of the fluid and for introducing the droplet to the channel through the fluid interface port.

134. (Original) The microfluidic device of claim 133, wherein the droplet generating system comprises a droplet carrying element for carrying the droplet.

135. (Original) The microfluidic device of claim 134, wherein the droplet carrying element comprises a pin for introducing the droplet to the fluid interface port by contacting the virtual wall.

136. (Original) The microfluidic device of claim 120, further comprising an array of fluid interface ports forming a plurality of virtual walls, wherein the array of fluid interface ports wicks an externally applied second liquid into the microchannel.

137. (Original) The microfluidic device of claim 120, wherein the fluid interface port has a cylindrical or conical shape.

138. (Original) The microfluidic device of claim 120, further comprising a first fluid disposed in the interior of the channel and forming a virtual wall in the fluid interface port.

139. (Original) The microfluidic device of claim 120, wherein the fluid interface port is adapted to allow the bi-directional exchange of fluid with the microchannel through the fluid interface port.

140. (Original) The microfluidic device of claim 120, wherein the microchannel is non-linear in shape.

141. (Original) The microfluidic device of claim 140, wherein the microchannel is substantially U-shaped.

142. (Original) The microfluidic device of claim 120, further comprising a hydrophobic patch disposed in the microchannel.

143. (Original) The microfluidic device of claim 142, wherein the hydrophobic patch is arranged substantially co-axially with the fluid interface port.

144. (Original) The microfluidic device of claim 90, wherein the microchannel comprises a semi-open channel structure formed in a substrate.

145. (Original) The microfluidic device of claim 144, further comprising a cover for covering the semi-open channel structure to form an enclosed microchannel, the enclosed microchannel forming the interior bounded by the side wall, the side wall being formed by the substrate and the cover.

146. (Original) The microfluidic device of claim 145, wherein the fluid interface port is formed in the cover.

147. (Original) The microfluidic device of claim 120, further comprising an ejector coupled to the microchannel for ejecting a droplet of a fluid in the microchannel through the virtual wall formed in the fluid interface port.

148. (Original) The microfluidic device of claim 147, wherein the ejector comprises at least one of a pressure pulse generator for applying a pressure pulse to the fluid to eject the droplet thereof through the virtual wall formed in the fluid interface port, a gas pressurizer, a voltage generator, and a heater located opposite the virtual wall for heating a fluid to produce a gas bubble, wherein the gas bubble ejects a droplet of the fluid through the virtual wall.

149. (Original) The microfluidic device of claim 120, further comprising a second fluid interface port disposed opposite to the fluid interface port and coaxially arranged therewith.

150. (Original) The microfluidic device of claim 149, further comprising

a first optical element disposed relative to the optical window to allow optical energy to pass therethrough,

a second optical element disposed relative to the second interface port to allow optical energy to pass therethrough, and

an optical detector disposed relative to one of the first and second optical elements for optically detecting the optical energy from the fluid in the microchannel passing through the optical element.

151-196. (Canceled)

197. (NEW) A microfluidic device, comprising:

a microchannel having an interior bounded by a side wall; and

a fluid interface port formed in the side wall of the microchannel to provide access to the interior of the microchannel, wherein the fluid interface port has a diameter between about 25 μm and about 100 μm, such that when a fluid is disposed in the interior of the microchannel, the fluid forms a virtual wall at the fluid interface port, wherein the fluid interface port has an inner wall comprising a material that is repellent to the fluid disposed in the interior of the microchannel.

198. (NEW) The microfluidic device of claim 197, wherein the material comprises a hydrophobic material.

199. (NEW) A microfluidic device, comprising:

a microchannel having an interior bounded by a side wall; and

a fluid interface port formed in the side wall of the microchannel to provide access to the interior of the microchannel, wherein the fluid interface port has a diameter between about 25 μm and about 100 μm, such that when a fluid is disposed in the interior of the microchannel, the fluid forms a virtual wall at the fluid interface port,

wherein an interior surface of the side wall of the microchannel is attractive to the fluid disposed in the interior of the microchannel

200. (NEW) The microfluidic device of claim 199, wherein the interior surface of the side wall is formed of a hydrophilic material.

201. (NEW) A microfluidic device, comprising:

a microchannel defining an interior bounded by a side wall; and

a fluid interface port formed in the side wall of the microchannel to provide access to the interior of the microchannel, wherein the fluid interface port is sized and shaped such that when

a fluid is disposed in the interior of the microchannel, the fluid forms a virtual wall in the fluid interface port; and

a covering layer disposed over the fluid interface port for covering the fluid interface port.

202. (NEW) The microfluidic device of claim 201, wherein the covering layer comprises a covering fluid that is immiscible with the fluid disposed in the interior of the microchannel.

203. (NEW) The microfluidic device of claim 201, wherein the covering layer comprises a non-evaporating liquid.

204. (NEW) A microfluidic device, comprising:

a microchannel having an interior bounded by a side wall;

a fluid interface port formed in the side wall of the microchannel to provide access to the interior of the microchannel, wherein the fluid interface port has a diameter between about 25 μm and about 100 μm, such that when a fluid is disposed in the interior of the microchannel, the fluid forms a virtual wall at the fluid interface port; and

a droplet generating system comprising a droplet carrying element for forming and carrying a droplet of the fluid and for introducing the droplet to the channel through the fluid interface port.

205. (NEW) The microfluidic device of claim 204, wherein the droplet carrying element comprises a pin for introducing the droplet to the fluid interface port by contacting the virtual wall.

206. (NEW) The system of claim 204, further comprising a droplet guiding system for directing the droplet toward the virtual wall.

207. (NEW) The system of claim 204, wherein the droplet generator comprises a nozzle assembly.

208. (NEW) The system of claim 207, wherein the nozzle assembly comprises a breaking off point where the droplet is formed, and the system further comprises a droplet charger comprises a charging circuit and a droplet electrode for charging the droplet at the breaking off point.

209. (NEW) The system of claim 206, wherein the droplet guiding system comprises a droplet charger for charging the droplet and including a droplet electrode.

210. (NEW) The system of claim 209, wherein the droplet charger further comprises a droplet charging circuit connected to the droplet electrode.

211. (NEW) The system of claim 209, wherein the droplet charger further comprises a ground electrode for guiding the charged droplet.

212. (NEW) The system of claim 206, wherein the droplet guiding system comprises one or more electrically controlled deflection plates for establishing an electric field to direct the droplet to the virtual wall.

213. (NEW) The system of claim 205, further comprising an array of fluid interfacing ports forming a virtual wall in each said fluid interface port.

214. (NEW) The system of claim 206, wherein the droplet guiding system comprises a channel charging circuit for selectively providing a charge to the microchannel.

215. (NEW) The system of claim 214, wherein the channel charging circuit charges the fluid channel to attract the charged droplet.

216. (NEW) The system of claim 215, wherein the channel charging circuit charges a neighboring fluid channel to repel the charged droplet.

217. (NEW) The system of claim 206, wherein the droplet guiding system comprises a targeting electrode adjacent to the virtual wall for targeting charged droplets towards the virtual wall.

218. (NEW) The system of claim 217, further comprising a targeting electrode charging circuit for charging the targeting electrode.

219. (NEW) The system of claim 204, further comprising:

a first reservoir including a first electrode connected to a first end of the microchannel;

a second reservoir including a second electrode connected to a second end of the microchannel; and

a voltage generator for establishing an electric field between the first electrode and the second electrode, thereby inducing movement of the first fluid through the microchannel.

220. (NEW) A microfluidic device, comprising:

a microchannel having an interior bounded by a side wall;

a fluid interface port formed in the side wall of the microchannel to provide access to the interior of the microchannel, wherein the fluid interface port has a diameter between about 25 μm and about 100 μm, such that when a fluid is disposed in the interior of the microchannel, the fluid forms a virtual wall at the fluid interface port; and

an ejector coupled to the microchannel for ejecting a droplet of a fluid disposed in the microchannel through the virtual wall in the interface port.

221. (NEW) The microfluidic device of claim 220, wherein the ejector comprises at least one of a pressure pulse generator for applying a pressure pulse to the fluid to eject the droplet thereof through the virtual wall formed in the fluid interface port, a gas pressurizer, a voltage generator, and a heater located opposite the virtual wall for heating a fluid to produce a gas bubble, wherein the gas bubble ejects a droplet of the fluid through the virtual wall.

222. (NEW) A microfluidic device, comprising:

a microchannel defining an interior bounded by a side wall; and

a fluid interface port formed in the side wall of the microchannel to provide access to the interior of the microchannel, such that when a fluid is disposed in the interior of the microchannel, the fluid forms a virtual wall in the fluid interface port;

wherein the microchannel comprises a semi-open channel structure formed in a substrate, and further comprising a cover for covering the semi-open channel structure to form an enclosed microchannel, the enclosed microchannel forming the interior bounded by the side wall, the side wall being formed by the substrate and the cover.